customer is unable to receive calls as a result of the hot cut. If AT&T would prefer to activate number portability itself, AT&T can use one of Verizon's other hot cut processes.

37. Finally, AT&T claims that it needs to know when a cutover will occur because "AT&T has sometimes experienced lack of conductivity immediately following the cut." AT&T's Sczepanski *et al.* Decl. ¶ 131. AT&T does not provide any evidence that such hot cut failures are occurring on a regular basis. If they were, they would appear in Verizon's hot cut performance reports. But, as I explained in my declaration, Verizon has completed virtually all hot cuts on time and without installation troubles for many years, even when volumes were increasing at a rapid pace. Verizon has not incurred any performance penalties for hot cuts.

III. Verizon's Hot Cut Processes Are Already Highly Mechanized.

38. Verizon utilizes the most efficient technology currently available for performing hot cuts. Verizon has mechanized virtually all aspects of the hot cut process from the initial hot cut order to the communication with the competing carrier throughout the hot cut process. The only aspect of the hot cut process that is not mechanized is the physical disconnection and connection of wires (*i.e.*, the "lift-and-lay") and that wiring work takes only minutes to complete during a hot cut. There is currently no viable means to mechanize the manual wiring work involved in a hot cut.

39. MCI does not criticize Verizon's batch hot cut process itself. Rather, MCI claims that Verizon should be making widespread use of automated frames for migrating end-user customers from one switch-based provider to another. MCI's Starkey/Morrison Decl. ¶¶ 27-29. Automated frames do not currently exist in a form that will cost-

effectively support hot cuts on a widespread basis in Verizon's network. If these technologies become feasible and cost-effective at some point in the future, Verizon would certainly consider deploying them in its network.

40. Devices do exist that automatically make copper-to-copper physical connections between any of a set of input positions and any of a set of output positions. For the most part, Verizon uses these devices in small, unstaffed central offices that serve an average of a few thousand lines. By enabling Verizon to make cross-connections automatically and remotely, such devices reduce the need for frame technicians to travel to those offices. At present, less than one half of one percent of Verizon's lines are in central offices that are currently equipped with automated frames and each of those central offices serve fewer than 5,000 lines. None of these central offices have collocation arrangements and, therefore, none of these devices are being used to perform hot cuts

41. Such automated frames devices cannot be efficiently scaled up to serve larger central offices. In order to manage central offices of larger than 5,000 lines, the only solution at present is to divide a frame into "zones" roughly the size of the cross-connect system. In order to be able to use the automated frame for any hot cut in the central office, extensive cross-connections would be necessary between the individual "zones." For larger central offices, the number of zones necessarily increases, as does the number of positions on the cross-connect device that would have to be devoted to inter-zone connections. This need for partitioning, and for cross-connections between the partitioned zones, would render such devices unusable for large-scale central offices. The only theoretical alternative to this sort of daisy-chaining would be to segment the

wire center so that certain lines could be connected only to certain ports or POT bay appearances. This would not be a viable option for competing carriers that want the ability to access any loop served by the central offices in which they collocate.

42. Moreover, although automated cross-connect devices can connect and disconnect circuits automatically, these devices must be manually wired to the frame to establish conductivity to the loop, to Verizon's switch, and to the competing carriers' collocation arrangements. There are two choices for establishing this connectivity. First, the necessary connections could be established on an as-needed basis. In that scenario, however, the need for a manual connection in order to implement a hot cut request would not be eliminated. (MCI has acknowledged that such a strategy would not make any sense.[4]) Second, the loops and switch ports served by the central office could all be pre-wired to the automated system through the frame. In addition, the competing carrier's collocation arrangements would need to be prewired to the automated cross-connect system. Thus, in order to "automate" the manual lift-and-lay step in a hot cut, which takes only minutes to complete, MCI's automated frames proposal would entail substantial investments in new automated cross-connect devices and countless hours of wiring work to install those devices to loops, switch ports and collocation arrangements.

43. AT&T claims that Verizon's hot cut ordering processes are not sufficiently automated and that they should be modified to enable a higher percentage of orders to "flowthrough" Verizon's ordering processes. AT&T's Sczepanski *et al.* Decl. ¶ 169. "Flowthrough" is the process by which a competing carrier's Local Service

[4] *See* MCI Comments and Proposal Regarding Functionalities That Differ from Verizon's Current Manual Hot Cut Process, New York Public Service Commission, Case 02-C-1425 (filed July 28, 2003).

Request ("LSR"), submitted through the Electronic Data Interface ("EDI") or Local Service Interface ("LSI") with Verizon, is routed to Verizon's gateway systems and then to Verizon's Service Order Processor ("SOP"), where it is confirmed automatically, without the assistance of Verizon's representative. The LSR must pass a series of edits applied in the interfaces, gateway systems, and SOP before it can be confirmed.

44. Verizon has already modified its ordering systems to enable "flowthrough" of hot cut orders converting existing UNE-P arrangements. These changes were implemented through the Change Management Process and are now available to competing carriers throughout Verizon's footprint. In addition, the New York Public Service Commission found that "Verizon should be able to refine the ordering stage of hot cuts such that orders should 'flow through' Verizon's computer systems 95 percent of the time."[5]

IV. Verizon's Batch Hot Cut Process Does Not Need To Be Tested.

45. Contrary to the suggestions of AT&T and MCI, there is no need to test Verizon's batch hot cut process. First, Verizon's batch hot cut process incorporates many aspects of Verizon's existing hot cut processes, such as the large job hot cut process. Most of the "piece parts" of Verizon's batch hot cut process already exist and have been successfully used to complete hundreds of thousands of hot cuts. For example, Verizon's unique Wholesale Provisioning and Tracking System ("WPTS") currently has the ability to identify and count hot cut orders on a central-office-by-central-office basis. This is essentially the accumulation or "batching" aspect of Verizon's batch hot cut process. WPTS is also a proven communication tool, utilized by many competing carriers across

[5] NY Order at 4.

the nation. In addition, Verizon already activates ports for itself on winback orders and has ported many wireless numbers. Verizon therefore has significant experience managing the port activations offered as part of the batch hot cut process. Verizon's central office technicians currently manage projects for a number of competing carriers across the country; thus, Verizon is also experienced with the management of "batch" cutovers themselves.

46. Second, Verizon has already implemented the system changes necessary for Verizon's batch hot cut process and has completed trials of that process with a number of competing carriers. Verizon is willing to conduct additional trials of its batch hot cut process with any other competing carrier. Through the trials of Verizon's batch hot cut process, Verizon and competing carriers are able to scrutinize all aspects of the process and to make modifications that may be needed.

47. Finally, hot cut volume testing would be costly for Verizon and competing carriers. Verizon would have to create hundreds of test accounts and arrange for the use of collocation space at central offices so that connectivity can be established at the Verizon frame and switch. Competing carriers would have to devote substantial resources to sustain a high level of cooperation for the hot cut volume. Verizon and competing carriers would have to hire and train large numbers of people to perform and manage the hot cut testing.

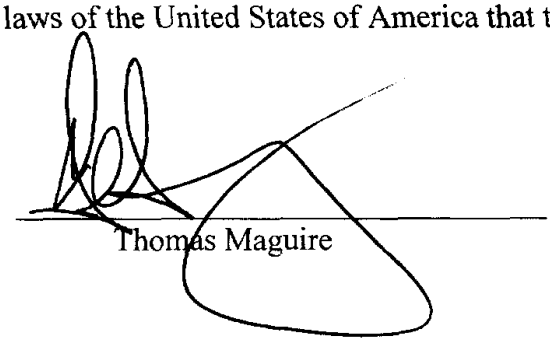
VI. Conclusion

48. Verizon has hot cut processes that are more than capable of handling the volumes that might result from the elimination of unbundled switching and UNE-P arrangements. The New York PSC has thoroughly reviewed Verizon's hot cut processes,

including Verizon's batch hot cut process, and concluded that these processes are fully scalable and capable of handling the volumes of hot cuts that would result from the elimination of UNE-P.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on October 15, 2004



Thomas Maguire

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Unbundled Network Access Elements	)	WC Docket No. 04-313
	)	
Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers	)	CC Docket No. 01-338
	)	
	)	
	)	

REPLY DECLARATION OF ROBERT W. CRANDALL AND HAL J. SINGER

OCTOBER 18, 2004

CRITERION ECONOMICS, L.L.C.

INTRODUCTION AND SUMMARY OF CONCLUSIONS

1. My name is Robert W. Crandall. I am the chairman of Criterion Economics and Senior Fellow in Economic Studies at the Brookings Institution in Washington.

2. My name is Hal J. Singer. I am co-founder and President of Criterion Economics.

3. We file this declaration in our individual capacities and not on behalf of the Brookings Institution, which does not take institutional positions with respect to specific legislation, litigation, or regulatory proceedings. Our curriculum vitas are provided in Exhibits 1 & 2.

4. We have been asked by Verizon to respond to comments from several parties concerning how to define the appropriate product market for the purposes of the FCC's impairment analysis. As we explain, two products do not have to be identical in all attributes to be in the same product market. Rather, two products are in the same product market if the availability of one product constrains the pricing of the other—that is, if a price increase in one product could be made unprofitable by a sufficient share of consumers switching to the other product. As we discuss below, from this economic standpoint, the evidence is clear that wireless, switched cable telephony, and Voice over Internet Protocol (VoIP) are all in the same product market as wireline voice service.

I. THE APPROPRIATE WAY TO DEFINE PRODUCT MARKETS

5. From an economic standpoint, two products or services are considered to be in the same product market if a non-transitory price increase by a hypothetical firm that is the only seller of the first product would result in a sufficient share of consumers switching to the second

product as to make the price increase unprofitable.[1] In other words, the key question is whether enough consumers regard the new products as alternatives such that they constrain the pricing of the original product. As we discuss below, it is clear that consumers view wireless, cable switched telephony, and VoIP as viable alternatives to wireline service and that they are all in the same product market.

6. It is not necessary, as the CLECs suggest, for all potential mass market customers to perceive wireless, VoIP, and cable telephony as *perfectly* fungible. Wireless, cable telephony, and VoIP are part of the same product market that contains an ILEC's local service so long as a sufficient share of the ILEC's consumers perceive those rival technologies to be a viable alternative. Thus, MCI is incorrect in its comments when it proclaims that VoIP is not in the same product market because VoIP is only available to "the *minority* of households that can afford a broadband connection."[2] As an initial matter, as the record evidence demonstrates, this assertion is factually wrong: for customers who have not yet subscribed to broadband service, the combination of broadband service and VoIP is competitive with what customers pay for a bundle of local, long distance and dial-up Internet access; there is no problem of "affording" the connection.[3] Moreover, proponents of mandatory unbundling forget that competition for customers (and economic decision-making in general) occurs at the margin—a "minority" of

1. 1997 Department of Justice and Federal Trade Commission Horizontal Merger Guidelines, § 1.1 (available at http://www.usdoj.gov/atr/public/guidelines/hmg.htm).
2. MCI Comments at 4 (emphasis added).
3. *See, e.g.*, Declaration of Michael K. Hassett and Vincent J. Woodbury, filed with Comments of Verizon Communications, WC Docket 04-313, Oct. 4, 2004, at ¶ 46; *2004 UNE Fact Report* at II-19.

households might be sufficient to constrain ILEC prices.[4] In the next section, we present evidence on the extent to which mass market customers perceive wireless, cable telephony, and VoIP as viable alternatives to the ILECs' voice services.

II. WIRELESS TELEPHONY IS A VIABLE ALTERNATIVE FOR A SUFFICIENT SHARE OF MASS MARKET VOICE CUSTOMERS

7. The wireless revolution began with the FCC's spectrum auctions in the mid-1990s, and continues to influence our daily professional and personal routines with the introduction of new devices such as Blackberry email devices and wireless picture phones.[5] Competition among six (soon to be five) nationwide service providers has resulted in a sharp decline in wireless prices and a rapid increase in wireless minutes since 1999.

A. The Decline in Wireless Average Revenue Per Minute Compared to Local and Long Distance Rates

8. A common indicator of wireless pricing is average revenue per minute (ARPM). ARPM is determined by dividing average revenue per unit (ARPU) by minutes of use (MOU). Figure 1 shows the ARPU and ARPM earned by wireless carriers since 1987.

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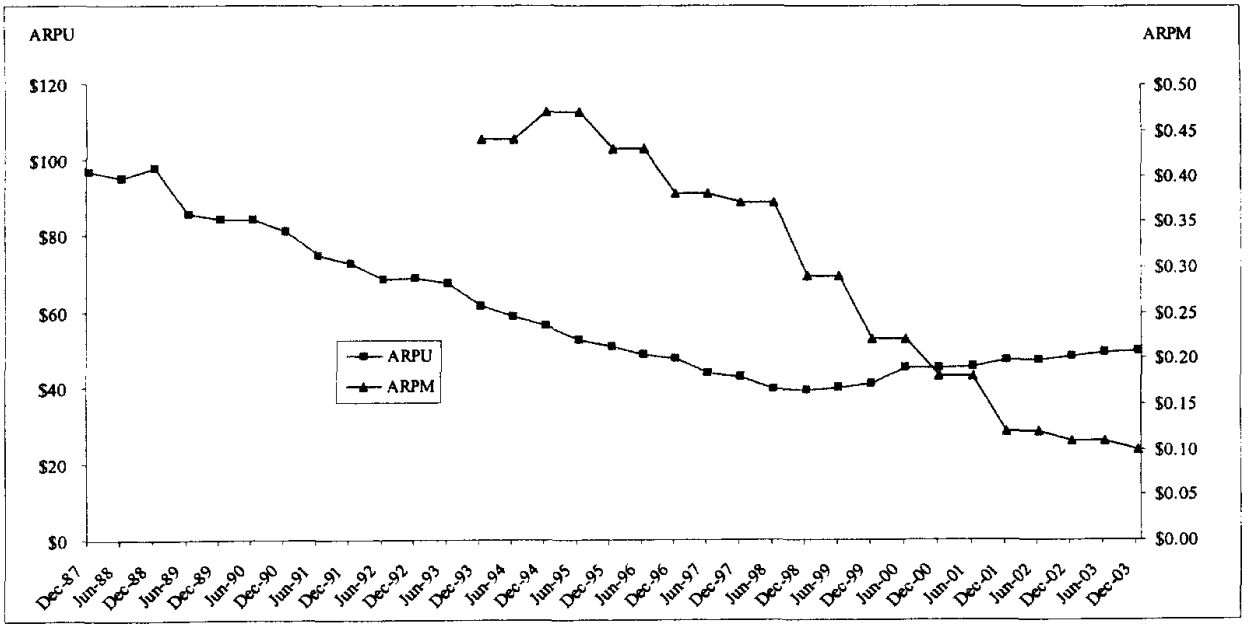
4. It bears emphasis that broadband (and therefore VoIP) is available to the large majority of households from a provider other than the incumbent LEC. *See* NCTA, *Industry Overview: Statistics & Resources* (available at http://www.ncta.com/Docs/PageContent.cfm?pageID=86) (95.6 million homes passed by cable modem service as of year-end 2003); J. Halpern, *et al.*, BERNSTEIN RESEARCH CALL, *Broadband Update: DSL Share Reaches 40% of Net Adds in 4Q . . . Overall Growth Remains Robust*, Mar. 10, 2004, at 7 and Exhibits 1 & 6 (By year-end 2004, 90 percent of U.S. households will have access to broadband over cable).

5. *See, e.g.*, Yuki Noguchi, *No Escape from E-Mail*, WASH. POST, Sept. 29, 2004, at A8.

FIGURE 1: AVERAGE REVENUE PER UNIT AND AVERAGE REVENUE PER MINUTE (1987-2004)



Source: *FCC's Ninth CMRS Report* at Tables 1, 9.

As Figure 1 shows, ARPM decreased rapidly from $0.37 per minute in 1997 to a low of $0.10 per minute in 2003—a decrease of nearly 73 percent in five years.

B. The Increase in Wireless Minutes Since 1999

9. The decrease in wireless prices has induced a large increase in the quantity of wireless minutes consumed. Table 1 shows the number of billed wireless minutes consumed by year since 1993.

TABLE 1: BILLED WIRELESS MINUTES (1993-2003)

Year (mid-year)	Average Subscribers (millions)[1]	Average Minutes per Subscriber per Month[2]	Total Wireless Minutes (million/yr.)*
1993	13.52	140	22,714
1994	20.07	119	28,660
1995	28.95	119	41,341
1996	34.09	125	51,135
1997	49.68	117	69,751
1998	62.26	136	101,608
1999	77.63	185	172,339
2000	97.76	255	299,146
2001	118.93	380	542,321
2002	134.57	427	689,537
2003	148.07	507	900,858

Source: (1) CTIA's Semi-Annual Wireless Industry Survey; (2) FCC's Ninth Annual CMRS Report (average MOUs for 1993-2003).
Note: * Equal to 12 times the product of average subscribers and average minutes per subscriber per month.

As Table 1 shows, by 2003, wireless minutes of use reached 900.8 billion, an increase of 30.6 percent from 2002 and more than tripling since 2000. Average minutes of use per subscriber have doubled since 2000. Where are all these minutes coming from?

10. Many of these wireless minutes come at the expense of wireline minutes. Wireless-wireline displacement can occur in two ways. First, calls that otherwise would be placed on a wireline network are being placed on a wireless network, particularly because they can often be more affordable on a wireless network. Below, we provide some original analysis on the migration of long distance traffic in particular from the fixed to the wireless network. Second, wireless phones are displacing primary or secondary landline connections or both.[6]

6. The FCC itself has chronicled the displacement of wireline services by wireless services in each of its annual *CMRS Competition Reports*. In Exhibit 3, we provide a table that summarizes the FCC's findings from 2000 through 2003.

C. The Displacement of Traffic from Wireline to Wireless

11. The first route for wireless service to displace landline service is by changing the way consumers make calls. An increasing amount of both local and long distance traffic is migrating from wireline to wireless networks in response to the offering of national calling plans under which consumers pay a monthly fee for a bucket of minutes.[7] This diversion of traffic from wireline to wireless networks is particularly evident in the context of long distance minutes because such minutes are specifically tracked for both wireline and wireless providers. As we show below, by 2002, the actual number of long distance switched access minutes was more than *400 billion* below what would be expected based on previous trends and other relevant variables. At the same time, the number of interstate wireless minutes grew dramatically. A significant portion of the unexpected gap in long distance wireline minutes was lost to wireless. Not surprisingly, as is evident from the development of new pricing plans for wireline service similar to the national calling plans described above for wireless, this displacement of minutes from wireline to wireless networks constrains the prices for wireline voice service.

12. Until the last five years—about the time that wireless carriers began introducing national calling plans—total long distance minutes carried over the nation's fixed-wireline network grew rapidly as long distance rates fell after 1984. The best measure of this growth is the increase in interstate switched access minutes reported by the National Exchange Carriers

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7. D. Janazzo, *et al.*, MERRILL LYNCH, *The Next Generation VIII: The Final Frontier?*, Mar. 15, 2004, at 5 (estimating that "approximately 23% of voice minutes in 2003 were wireless," and that for 2004 "wireless could make up approximately 29% of voice minutes in the US"); *Eighth CMRS Report* at ¶ 102 (2003) ("One analyst estimates that wireless has now displaced about 30 percent of total wireline minutes."); *Ninth CMRS Report* at ¶ 213 ("One analyst estimated . . . that 23 percent of voice minutes in 2003 were wireless, up from 7 percent in 2000.").

Association to the FCC.[8] Total interstate switched access minutes grew at an average annual rate of 8.0 percent between 1985 and 1999, propelled by a 9.8 percent annual decline in the average inflation-adjusted revenue per minute for interstate calls. Despite the fact that interstate rates continued to decline after 1999, interstate switched access minute growth slowed and then began to decline rapidly after 2000, as seen in Figure 2. Between 2000 and 2003, interstate switched access minutes declined by more than 8 percent per year.

13. This decline in interstate switched access minutes has resulted in a total number of minutes well below what one would forecast based on changes in real interstate revenues per minute, real gross domestic product, and a time trend that captures a steady shift of originating access to "special access."[9] Such a forecast tracks actual switched access minutes very closely between 1985 and 1996, as Figure 2 shows.

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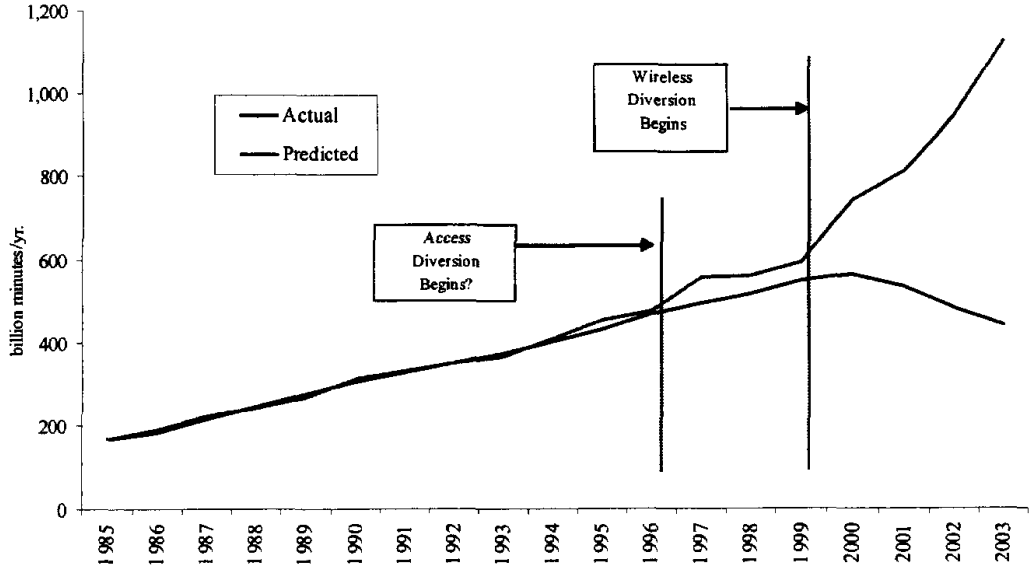
8. These data are reported by the FCC's Industry Analysis Division in *Trends in Telephone Service*, May 2004, Table 10-1.

9. The equation used to predict switched access minutes is log linear. Revenue per minute is from the FCC's Industry Analysis division and it is deflated by the overall Consumer Price Index for Urban Consumers. Real GDP is obtained from the Bureau of Economic Analysis. The coefficient of the deflated revenue per minute is -0.75; the coefficient on real GDP is 1.0, and the time trend has a coefficient of -0.1.

FIGURE 2: ACTUAL VERSUS PREDICTED TOTAL INTERSTATE SWITCHED ACCESS MINUTES



As Figure 2 shows, between 1997 and 1999, a small gap opened up between the predicted number of minutes and actual minutes, probably due to some diversion by inter-exchange carriers of interstate minutes to "local interconnection," which is much less expensive. A much larger gap opens up, however, after 1999, when switched access minutes begin to fall and the predicted number soars due to sharply declining interstate rates. By 2002, the gap is almost 50 percent (465.3 billion minutes), and by 2003—using an estimate for the average revenue per minute[10]—the gap grows to 60 percent, or 50 percent more than the gap that existed between 1997 and 1999.

14. During the same period that the number of long distance wireline minutes was falling well below expectations, the number of wireless minutes grew rapidly. Although, as

10. The FCC's Industry Analysis Division has not yet published its estimate for average revenue per interstate conversation minute for 2003.

Table 1 demonstrates, there was no growth in the average number of minutes used by wireless subscribers between 1993 and 1998, beginning in 1999, the average minutes of wireless began to rise very rapidly. Had CTIA's estimated 134.57 million subscribers in 2002 used their cell phones at 1998 levels, when wireless long-distance calls were much more expensive, they would have amassed 469.9 billion fewer minutes (equal to 689.5 billion minutes less 134.57 million subscribers x 136 minutes per month x 12 months).

15. A very large share of this increase in wireless minutes is undoubtedly attributable to long distance calls. According to the FCC's *Trends Report*, the number of interstate minutes on wireless networks increased from 16 percent to 26 percent of the total from 2000 through 2002.[11] Using the total wireless minutes of use from Table 1, the number of interstate minutes on wireless networks increased from 47.8 billion in 2000 to 179.3 billion in 2002. Hence, a significant share of the unexplained decrease in interstate switched access minutes over fixed networks was lost to wireless networks. The remainder of the unexplained decrease in interstate minutes over the fixed network is likely attributable to other factors, such as email, instant messaging, and Internet-based long distance calling.

16. Once a customer begins using a wireless phone to displace wireline long distance, *local* service displacement occurs automatically as well because wireless service is sold in buckets of minutes that do not differentiate between local and long distance. Indeed, many fixed line operators introduced new *wireline* calling plans in direct response to the wireless national

11. INDUSTRY ANALYSIS AND TECHNOLOGY DIVISION, FCC, TRENDS IN TELEPHONE SERVICE, May 2004, at tbl. 11.4 (citing survey data from TNS Telecoms ReQuest Market Monitor).

calling plans. For example, Verizon introduced its "Freedom" package in the spring of 2003,[12] which gave residential customers unlimited local, local toll, and long distance, as well as many vertical features such as caller id, call waiting, and voicemail for a flat monthly fee. SBC's "All Distance Connection" and BellSouth's "Value Answers Premier" offer unlimited local and long distance service at fixed monthly rate. These responses suggest that fixed line suppliers of voice services perceive wireless and wireline service as alternatives, and support our conclusion that the pricing of wireless minutes constrains the pricing of wireline voice service.

D. Primary and Secondary Line Displacement

17. Wireless-wireline displacement is also occurring at the expense of primary and secondary fixed access lines. In its *Seventh Annual CMRS Report*, the FCC reported that by the end of 2001, wireless connection "had displaced 10 million access lines, primarily by consumers choosing wireless over installing additional access lines."[13] In its *Sixth Annual CRMS Report*, the FCC reported that in January 2000, 12 percent of respondents to an IDC survey said they purchased a wireless phone instead of installing an additional wireline phone.[14]

18. In its annual *Trends in Telephone Service* report, the FCC compares the number of residential local loops with the number of households with telephone service.[15] The difference between these series is considered a proxy for the number of additional—that is, second, third, or fourth—residential access lines. Figure 3 plots the decrease in switched access lines over time

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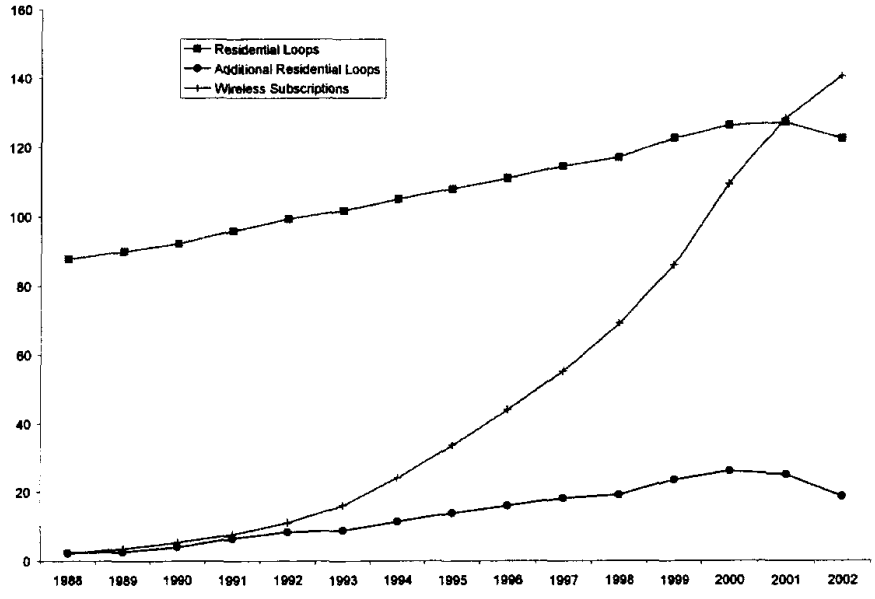
12. *Verizon Launches Long-Distance Service In Maryland, Washington, D.C.*, PR NEWSWIRE, Apr. 15, 2003.
13. *Seventh CMRS Report* at 33 (citing *It's a Wireless Boom as More People Cut the Cord*, News Release, IDC, Jan. 8, 2002).
14. *Sixth CMRS Report* at 33 (citing Callie Nelson, *Replacing Landline with Wireless: How Far Can It Go?*, IDC, Dec. 2000).
15. *Trends in Telephone Service*, May 2004, at tbl. 7.4.

(both total residential lines and additional residential lines) against the increase in wireless subscriptions.

FIGURE 3: DECLINING RESIDENTIAL LOOPS AND ADDITIONAL RESIDENTIAL LOOPS VERSUS RISING WIRELESS SUBSCRIPTIONS



Source: FCC Trends in Telephone Service, May 2004, at tbl. 7.4.

Fixed lines have recently begun to decline as wireless continues to grow. The growth rate in wireless subscriptions has averaged 21.5 percent since 1997. As Figure 3 shows, total wireless subscriptions overtook residential loops in 2001. The FCC estimates that additional fixed lines peaked at 26.2 million in 2000 and subsequently declined by 7.5 million lines over the next two years. In fact, because the number of second lines had been growing until 2000, the actual decline in the number of second lines from where they would have been if that growth had continued is even greater than the 7.5 million. One explanation for this decline is that wireless subscriptions began to displace second fixed lines. In the next subsection, we review some

econometric evidence that concludes that the cross-price elasticity of demand for second fixed lines to be roughly 0.24. Using this estimate, the demand for second fixed lines decreased by 9.9 percent (2.6 million lines or 35 percent of the decline in second lines) in response to the 41 percent decrease in the real price of wireless service from 2000 to 2002.[16] Of course, many of the second lines were also eliminated due to the adoption of broadband technologies such as cable modem service and DSL, which do not require a second fixed line.

19. Data on wireless displacement of primary lines is equally compelling. In its *Seventh Annual CMRS Report*, the FCC suggested that 3 to 5 percent of wireless customers used their wireless phones as their only phone in November 2001.[17] More recently, in February 2004, the Current Population Survey of the Census Bureau included a special supplement that addressed the topic of wireless phone usage. From this survey, the Census Bureau estimated that about 6 percent of all households rely on wireless phones as their only telephone service, a substantial increase from its previous estimate in November 2001 of slightly over 1 percent.[18] For households headed by someone under 24 years of age, 18.0 percent had a cellular telephone only; 9.6 percent of households headed by someone between 25 and 34 years of age had cellular telephones only.[19] The fact that this tendency is negatively correlated with age suggests that the percentage of homes with only cellular telephones is likely to increase over

16. *Ninth CMRS Report* at tbls. 1, 9.

17. *Seventh CMRS Report* at 33 (citing *Carriers Said to Need New Tactics to Combat LD Substitution*, COMM. DAILY, Mar. 15, 2002).

18. The survey was administered to roughly 32,000 households during February 2004. The survey asked about purchases and bills including spending on cellular phone and landline. In particular, the surveys asked whether (1) the household had a bill for local or long distance calls in the past three months and (2) the household had a bill for a cellular phone in the past three months. *See* Clyde Tucker, Brian Meekins, J. Michael Brick, & David Morganstein, Household Telephone Service and Usage Patterns in the United States in 2004, presented at the 2004 Annual Meeting of the American Association for Public Opinion Research.

19. *Id.* at 23.

time. Other analysts estimate the percentage of U.S. households that have "cut the cord" to be even higher.[20]

E. Academic Studies of the Cross-Price Elasticities of Demand for Mobile and Fixed Services

20. In a 2003 article in *Telecommunications Policy*, Mark Rodini, Michael R. Ward and Glenn A. Woroch estimated the own- and cross-price elasticities of demand for fixed and mobile telecommunications services using a U.S. household survey conducted over the period 2000 to 2001.[21] Specifically, Rodini, Ward and Woroch (RWW) model the demand for a second fixed line and a mobile line as a function of their own price, the prices of alternatives and complements, household income, and attributes of the household and the characteristics of the various alternatives. The principal source of their data is the Bill Harvesting data from TNS Telecom's ReQuest Market Monitor, a quarterly survey of U.S. household expenditures on various telecommunications services.[22] They specified a household's decision to subscribe to a

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20. *See, e.g.*, Adam Quinton, Managing Director & First VP, Co-Head of Global Telecom Services Research, Merrill Lynch, prepared witness testimony before the Subcommittee on Telecommunications and the Internet of the House Energy and Commerce Committee, Washington, DC, Feb. 4, 2004 ("indeed an estimated 7% of telephone users only have a cell phone"); Michael Balhoff, Managing Director, Telecommunications Group, Legg Mason, prepared witness testimony before the Subcommittee on Telecommunications and the Internet of the House Energy and Commerce Committee, Washington, DC, Feb. 4, 2004 ("while it is clear that there is substitution whereby wireless-only customers may be 8% of the total consumer market today, it is admittedly difficult to calculate precise figures"); B. Bath, LEHMAN BROTHERS, *Consumer VoIP Threat Overdone*, July 1, 2004, at Fig. 2 (estimating that wireless displacement accounts for approximately 8 percent of consumer telephony lines).

21. Mark Rodini, Michael R. Ward & Glenn A. Woroch, *Going Mobile: Substitutability Between Fixed and Mobile Access*, 27 TELECOMMUNICATIONS POLICY 457-76 (2003).

22. Rather than using actual prices from customers' bills, the authors estimated wireless and fixed prices using the empirical relationship between fixed and mobile bills and the observed usage levels of each service. For wireless prices, they specified a random coefficients regression to estimate a representative two-part tariff for each geographic region, where fixed-line prices vary by state and mobile prices vary by cellular franchise area. To address the endogeneity of prices in a demand model, the authors predicted prices using variables that were correlated with prices but were uncorrelated with household-level demand determinants

second fixed line or to mobile service using a binary logit model, which was estimated separately for each service.

21. RWW calculated several price elasticities that indicate that customers view fixed wireline service and wireless service as alternatives for one another. First, they found that the likelihood of a household subscribing to mobile service is decreasing with respect to the "mobile access price" (measured by the recurring *monthly* charge for the mobile subscription). Second, they concluded that the likelihood of a household subscribing to mobile service increases with respect to the "fixed access price" (measured by the recurring *monthly* charge for the second fixed line). In particular, the cross-price elasticity of the "fixed access price" on mobile demand was positive and statistically significant at the 1 percent level: 0.18 for 2000 and 0.13 for 2001. Third, they found own-price elasticities of mobile demand with respect to the "mobile usage price" (measured by the *per minute* charge for additional usage-sensitive charges for long distance and international service and when the user is "roaming" outside her home calling area) of –0.43 for 2000 and 2001, estimates which were statistically significant at the 1 percent level. Fourth, the authors found that the demand for second fixed lines was price elastic with demand elasticities of –0.69 and –0.65, which were significant at the 1 percent level. Finally, they also found a positive cross-price elasticity of second lines with respect to the "mobile access price" of 0.25 in 2001, but these coefficients were not statistically significant at the usual levels of confidence. The size of the coefficient is economically significant—a one percent decrease in the price of mobile service results in a 0.25 percent decrease in the demand for a second fixed line. Based on their estimated cross-price elasticities, RWW concluded that second fixed lines and

mobile services are viewed as alternatives for one another. In particular, they found a significant response in mobile subscription to fixed line rates.

22. In a forthcoming paper in *Information Economics and Policy*, Gary Madden and Grant Coble-Neal (MC-N) examined the interchangeability between fixed-line and mobile telephony using a global telecommunications panel dataset comprised of 58 countries from 1995 to 2000.[23] MC-N hypothesized that network effects, which arise from being able to call to a larger wireless subscriber base, are likely to stimulate mobile network growth, irrespective of the original cause of growth. Hence, obtaining an accurate measure of the impact of a change in relative subscription prices between fixed and mobile services requires controlling for network effects.

23. Their regression model posited that the change in the number of mobile subscribers in a given country is a function of the price of fixed services, the price of mobile services, income, the number of mobile subscribers in the prior time period, and the number of fixed subscribers. The data were taken from the International Telecommunications Union's *World Telecommunications Indicators Database*. MC-N resolved the problem of lagged dependent variables through instrumental variable estimation. Results of a likelihood ratio test supported the pooling of all countries contained in the sample except for the Republic of The Sudan and Togo. The ultimate model was therefore estimated with dynamic random effects estimations on the remaining 56 countries. With the exception of income, each of the explanatory

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23. Gary Madden & Grant Coble-Neal, *Economic Determinants of Global Mobile Telephony Growth* __ INFORMATION ECONOMICS AND POLICY at 3 (forthcoming 2004).

variables was estimated with statistical significance at the 5 percent level (income was significant at the 10 percent level).

24. MC-N concluded that mobile and fixed-line telephone subscription are competitive alternatives, with a one percent increase in the fixed price yielding a 0.12 percent mobile subscription growth increase. They also found that "a small decline in Mobile Price has an immediate 0.05 percent increase in [mobile] subscription growth."[24] They concluded that the "greatest effect of government intervention is likely from direct influences, such as stimulating price competition" and that "the imposition of local loop price controls may slow mobile network growth."[25]

III. CABLE TELEPHONY AND VOIP ARE VIABLE ALTERNATIVES FOR A SUFFICIENT SHARE OF MASS MARKET VOICE CUSTOMERS

25. Cable telephony and VoIP also provide consumers with close alternatives for copper-wire telephone service. Although cable systems and other VoIP providers provide voice services over a different platform, the calling experience and quality of calls are nearly identical to those delivered over the copper-wire platform. If anything, cable's platform—which has greater transmission capacity than the traditional copper wire network—is potentially superior to those of the ILECs.[26] Cable operators already consider themselves to be in direct competition

24. *Id.*
25. *Id.* at 13.
26. CITIGROUP SMITH BARNEY, TELECOMMUNICATIONS SERVICES—WIRELINE: THE BATTLE OF THE BUNDLE INTENSIFIES DURING 2Q, July 28, 2003, at 7 [hereinafter CITIGROUP SMITH BARNEY].

with ILECs for voice service customers.[27] Thus, both cable telephony and VoIP are in the same product market as wireline voice service.

A. Circuit-Switched Cable Telephony

26. According to the FCC, more than 3.2 million U.S. households subscribed to cable telephone service in December 2003.[28] Competition from cable operators is strong in many regions. One industry source notes that Cox is "already an experienced provider of telephone service" using circuit-switched technology.[29]

27. Verizon and other ILECs thus face significant competition from cable operators throughout their service areas, particularly from Comcast and Cox. Indeed, analysts note that aggressive pricing of cable telephony services is most pronounced in Verizon's territories[30] and project that Verizon stands to lose the largest share of its access lines to cable operators of any major ILEC.[31] The following is a brief synopsis of the circuit-switched activities of cable operators in Verizon's service area:

- **Comcast:** In December 2003, Comcast began offering "Comcast Connections Any Distance," an almost unlimited (5000 minutes) local and long-distance calling plan, to 1.5 million New England households.[32] The bundled offering from Comcast costs $49, but consumers pay only $45 if they purchase telephone service as part of a larger bundle that

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27. *See, e.g.*, COX COMMUNICATIONS, 2003 SEC FORM 10-K, Feb. 27, 2004, at 11-12.

28. INDUSTRY ANALYSIS AND TECHNOLOGY DIVISION, FCC, LOCAL TELEPHONE COMPETITION: STATUS AS OF DECEMBER 31, 2003, at 2 (2004).

29. *Cox Jumps into the Market for Internet Phone Calls*, TOTAL TELECOM, Dec. 16, 2003.

30. *See* Jonathan Atkin, David Coleman & Brian Hyun, RBC CAPITAL MARKETS, *Broadcasting & Cable TV: Cable/RBOC/DBS: Telephony, Data, and Video Pricing Comparisons*, Feb. 3, 2004, at 1.

31. *See* BERNSTEIN RESEARCH, *U.S. Telecom and Cable: Faster Rollout of Cable Telephony Means More Risk for RBOCs, Faster Growth for Cable*, Jan. 9, 2004, at 1-3.

32. *See* Peter J. Howe, *Comcast Launches Phone Plan*, BOSTON GLOBE, Dec. 15, 2003. Comcast also offers the Comcast Connections Any Distance plan to selected areas in California, Colorado, Connecticut, Georgia, Illinois, Maryland, Michigan, Minnesota, New Hampshire, Ohio, Oregon, Pennsylvania, Texas, Utah, Virginia, and Washington. See Comcast state tariffs (available at http://www.comcast.com/Products/Telephony/Tariffs.ash?id=27).

includes either broadband access or cable television.[33] Comcast reports a penetration rate of nearly 13 percent of homes where telephone service is available as of June 2004.[34]

- **Cox:** As of October 2004, Cox Digital Telephone service was available as a circuit-switched service in Phoenix, Tucson, Orange County, San Diego, Connecticut, New Orleans, Omaha, Oklahoma City, Wichita, Rhode Island, Hampton Roads, and Northern Virginia.[35] Cox's penetration rate of homes passed now averages 20 percent and rises as high as 35 percent in some markets—a penetration rate of up to 55 percent of Cox's cable customers.[36]

Cable switched telephony is therefore a viable alternative to wireline telephone service for consumers wherever it is offered.

B. Packet-Switched Cable Telephony via VoIP

28. Circuit-switched cable telephony is being eclipsed in importance as cable providers transition to offering voice service using Voice over Internet Protocol (VoIP)—a form of telephony that employs packet-switched technology. Whereas a circuit-switched network maintains a constant connection between two parties for the duration of a telephone call, a packet-switched network handles a call as digital data, thereby minimizing the connection time between two parties during a call and making less extensive use of network capacity.[37] VoIP systems thus lower the provisioning cost of local and long-distance service relative to traditional

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33. *Id.*

34. *See* Comcast Press Release, *Comcast Reports Second Quarter 2004 Results*, July 28, 2004, at Table 5.

35. Cox Communications, *Voice over Internet Protocol: Ready for Prime Time*, May 2004, at 4; Cox News Release, *Cox Communications Brings Digital Telephone Service to Northern* Virginia, Apr. 30, 2004.

36. *See Q1 2004 Cox Communications Inc. Earnings Conference Call – Final*, FD (FAIR DISCLOSURE) WIRE, Transcript 042904as.714, Apr. 29, 2004 (statement by Pat Esser, Cox executive vice president & COO); C. Moffett, *et al.*, BERNSTEIN RESEARCH CALL, *Cable and Telecom: Bernstein Study Finds Consumers Ready and Willing To Switch to Cable Telephony*, Dec. 9, 2003 (in Cox's most mature circuit-switched markets, share is now approaching 35 percent of homes passed); Matt Richtel, *Time Warner To Use Cable Lines To Add Phone to Internet Service*, N.Y. TIMES, Dec. 9, 2003 ("In Omaha, 45 percent of Cox's cable customers now subscribe to its telephone service, and in Orange County, Calif., that figure is 55 percent.").

37. Whereas a circuit-switched network maintains a constant connection between two parties for the duration of a telephone call, a packet-switched network minimizes the connection time between two parties during a call, thereby making less extensive use of network capacity. *See* Jeff Tyson, *How IP Telephony Works*, HOWSTUFFWORKS.COM (available at http://computer.howstuffworks.com/ip-telephony1.htm).

telephone networks and accommodate a greater array of advanced features as a result of their digital format.[38] These lower costs allow VoIP providers to offer consumers unlimited local and long-distance calling plans that are typically $15 per month less than similar unlimited plans offered by fixed-wire firms such as Verizon.[39] Cable companies have already begun to deploy VoIP services in Verizon's service area, and plan to expand those offerings to more customers in the near future:

- **Cablevision:** Using VoIP, Cablevision offers unlimited local and long-distance calling to all 4.4 million homes passed by its network in the greater New York City area (the vast majority of whom live in Verizon territory) for $34.95, inclusive of taxes and surcharges.[40] Cablevision also offers cable telephony together with high-speed cable modem service for $79.90, an amount that is $10 less than the cost of Verizon's Veriations Freedom + DSL package. Cablevision makes this comparison explicitly in its report, noting that "Cablevision consumers will save at least $10 per month / $120 per year vs. Veriations Freedom + DSL, the most comparable Verizon service bundle."[41] In June 2004, Cablevision rolled out a bundled offering that includes cable telephony, cable modem service, and digital cable for $89.85[42]—approximately the same amount that many customers already pay for digital cable and cable modem service alone. As a result, Cablevision says that customers "are essentially receiving their voice service for free."[43] Cablevision has been adding VoIP subscribers at a rate of 3,400 per week,[44] and within

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38. *See, e.g.*, Peter J. Howe, *Comcast Launches Phone Plan*, BOSTON GLOBE, Dec. 15, 2003. Time Warner Cable calculates that VoIP is 50 percent less expensive to provision than traditional circuit-switched architecture. TIME WARNER CABLE, UBS WARBURG MEDIA WEEK CONFERENCE, Dec. 11, 2003.

39. *See* Reinhardt Krause, *Internet Phone Calls Could Squeeze Prices*, INVESTOR'S BUSINESS DAILY, Dec. 12, 2003.

40. *See* Cablevision Press Release, *Direct-Dial International Calling Now Available with Cablevision's Optimum Voice*, Sept. 13, 2004; Optimum Voice, *Pricing* (available at http://www.optimumvoice.com/index.jhtml?pageType=pricing) (downloaded Oct. 12, 2004).

41. CABLEVISION, UBS WARBURG MEDIA CONFERENCE, Dec. 11, 2003, at 39. Cablevision's bundle of voice and high-speed data is nearly identical to Verizon's. The only differences are that Cablevision offers 3 Mbps broadband service compared to 1.5 Mbps for Verizon, and two of the five calling features offered by each company differ. *Id.*

42. *See Cablevision Promotional Offer for New Customers Features Digital Video, High-Speed Internet and Voice Services for the Monthly Price of $29.95 Each for First 12 Months If Taken Together*, PR NEWSWIRE, June 21, 2004.

43. *Cablevision To Offer Internet Phone-Call Bundle*, WALL ST. J., June 21, 2004, at B5 (quoting Cablevision senior vice president, consumer product management and marketing, Patricia Gottesman).

44. *See* A. Bourkoff, *et al.*, UBS, *Cablevision Systems: 2Q04 Results Ahead of Expectations*, Aug. 10, 2004, at tbl. 6 (net adds per week in 2Q04).

nine months of making the service available across its service area, Cablevision had signed up more than 115,000 subscribers.[45]

- **Time Warner:** Using VoIP, Time Warner offers unlimited monthly local and long-distance calling in several Verizon markets including New York City, Bergen, and Hudson Counties in New Jersey, Albany, Binghamton, Syracuse, and Portland, ME for $49.95 on an *a-la-carte* basis, but charges only $39.95 if the customer also subscribes to Time Warner for television service.[46] Time Warner passes 19 million homes nationwide and has launched VoIP in 30 of its 31 markets.[47] Furthermore, Time Warner is adding 1,200 new VoIP customers per day.[48] Time Warner's VoIP service has seen great success in Portland, ME, where 40 percent of its cable modem customers also subscribe to VoIP service.[49] In Raleigh, NC, Time Warner has signed up more than 20,000 customers since launching VoIP service in January 2004.[50]

- **Comcast:** Comcast—whose network passes 40.3 million homes nationwide—is expanding trial launches in Philadelphia, Springfield, MA, and Indianapolis. Comcast states that it will make half of all homes in its service areas VoIP ready by year-end 2004 and 95 percent by the end of 2005.[51]

29. Many of the cable telephony plans offered by cable operators—both circuit-switched and VoIP—are bundled offerings that include long distance, local calling, and other features. Time Warner's plan, for example, is technically a bundled package, as it includes unlimited local calling, long-distance calling, and vertical calling features. The price of Time Warner's plan ($39.95) is sufficiently low to discipline the ILECs' prices. Indeed, Time Warner notes that its digital phone service pricing is competitive against *both* average consumer phone bills and bundled offerings such as those offered by ILECs.[52]

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45. *See* Cablevision presentation at the Banc of America 34th Annual Investment Conference, Sept. 20, 2004, at 23.

46. Time Warner Cable, *Plan Details* (available at: http://www.twcdigitalphone.com).

47. Glenn Britt, Chairman and CEO, Time Warner Cable, presentation at the Merrill Lynch Media & Entertainment Conference, Sept. 28, 2004, at 3, 20, 21.

48. *Id.*

49. *See* Matt Stump, *Technology's Creative Master*, MULTICHANNEL NEWS, Sept. 27, 2004.

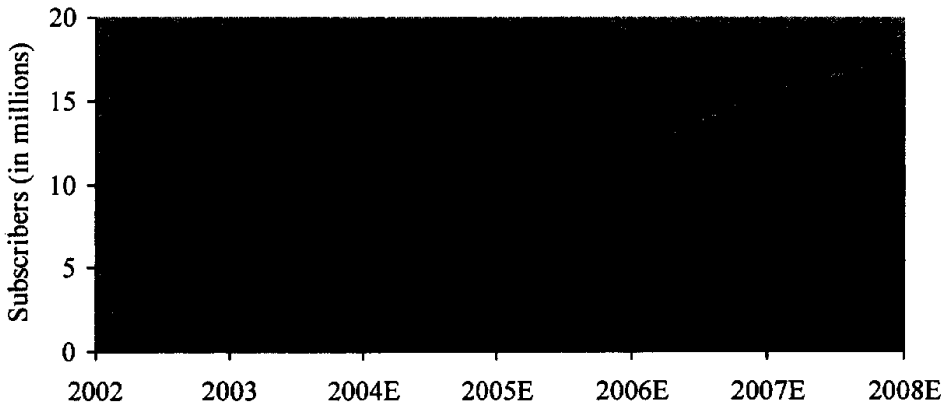
50 Glenn Britt, Chairman and CEO, Time Warner Cable, presentation at the Merrill Lynch Media & Entertainment Conference, Sept. 28, 2004, at 21.

51. Comcast Presentation at the Merrill Lynch Telecommunications, Media & Technology Conference, June 10, 2004, at 16 (available at http://media.corporate-ir.net/media_files/irol/11/118591/presentations/061004.pdf).

52. TIME WARNER CABLE, UBS WARBURG MEDIA WEEK CONFERENCE, Dec. 11, 2003.

30. Once cable operators upgrade their networks for cable telephony, cable providers quickly acquire a substantial share of the market for telephony services. Comcast has acquired 30 percent of primary lines in certain markets.[53] In Portland, Maine, Time Warner "got to 10% [penetration] pretty quickly" (within 10 months of introduction),[54] and now serves 14 percent of homes with access to its voice service—a penetration rate of 40 percent of cable modem subscribers.[55] Indeed, on January 9, 2004, Bernstein Research raised its cable telephony subscriber forecasts to account for "cable operators' accelerated telephony rollout plans."[56] Figure 4 shows the projected growth of cable telephony (both circuit-switched and VoIP).

FIGURE 4: PROJECTED GROWTH OF CABLE TELEPHONY THROUGH 2008



Source: Bernstein Research, U.S. Telecom and Cable: Faster Rollout of Cable Telephony Means More Risk for RBOCs, Faster Growth for Cable (Jan. 9, 2004) at Exhibit 1.

53. *See* BERNSTEIN RESEARCH, *U.S. Telecom and Cable: Faster Rollout of Cable Telephony Means More Risk for RBOCs, Faster Growth for Cable*, Dec. 17, 2003, at 5.

54. Matt Stump, *Technology's Creative Master*, MULTICHANNEL NEWS, Sept. 27, 2004 (quoting Time Warner Cable chief technology officer Mike LaJoie).

55. Glenn Britt, Chairman and CEO, Time Warner Cable, presentation at the Merrill Lynch Media & Entertainment Conference, Sept. 28, 2004; Matt Stump, *Technology's Creative Master*, MULTICHANNEL NEWS, Sept. 27, 2004.

56. BERNSTEIN RESEARCH, *U.S. Telecom and Cable: Faster Rollout of Cable Telephony Means More Risk for RBOCs, Faster Growth for Cable*, Dec. 17, 2003, at 1-3.